

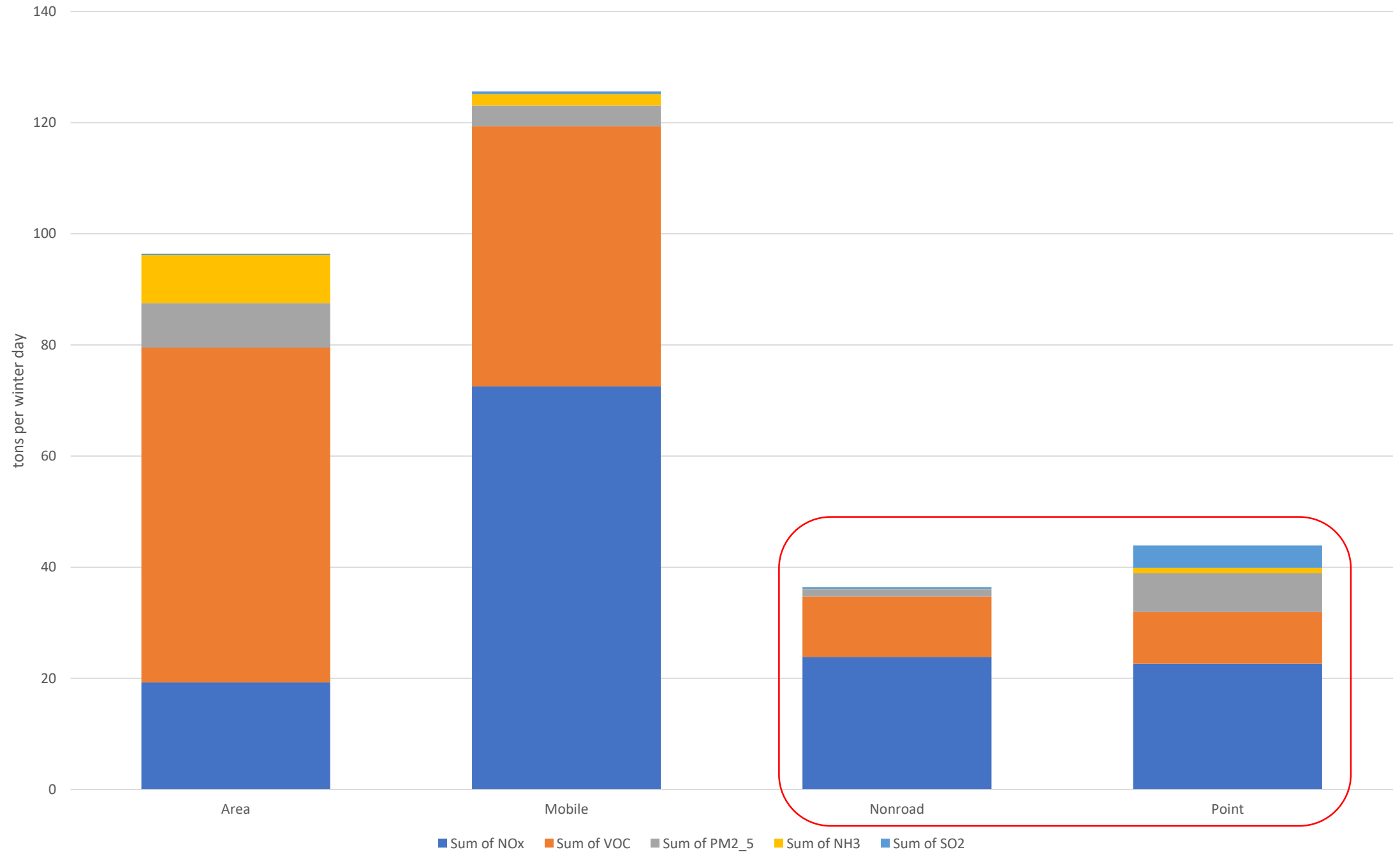
# Heavy-duty Equipment Emissions and Emissions Control Options

Presentation to the Public Utilities, Energy, and Technology Interim Committee

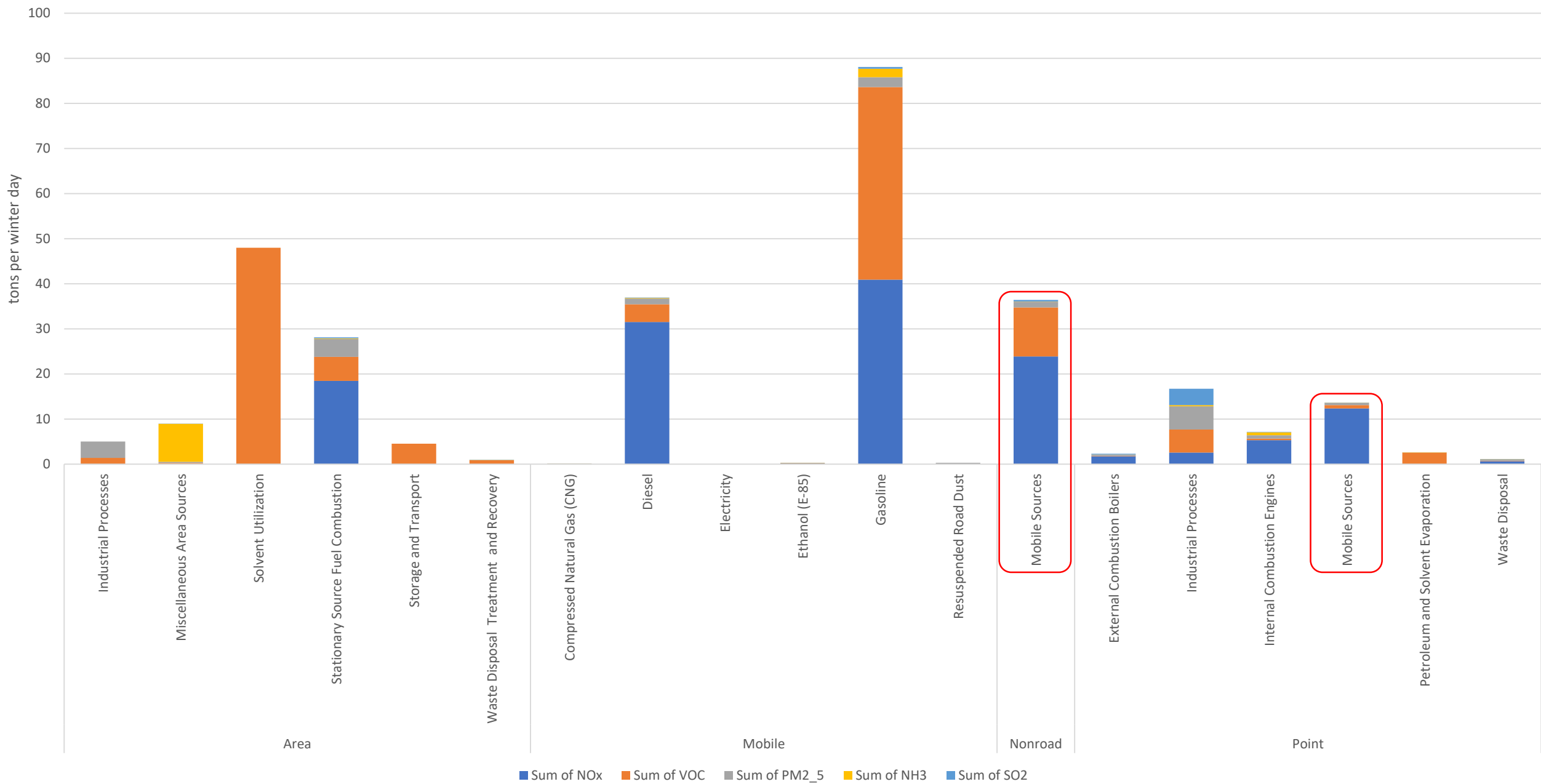
August 21, 2019



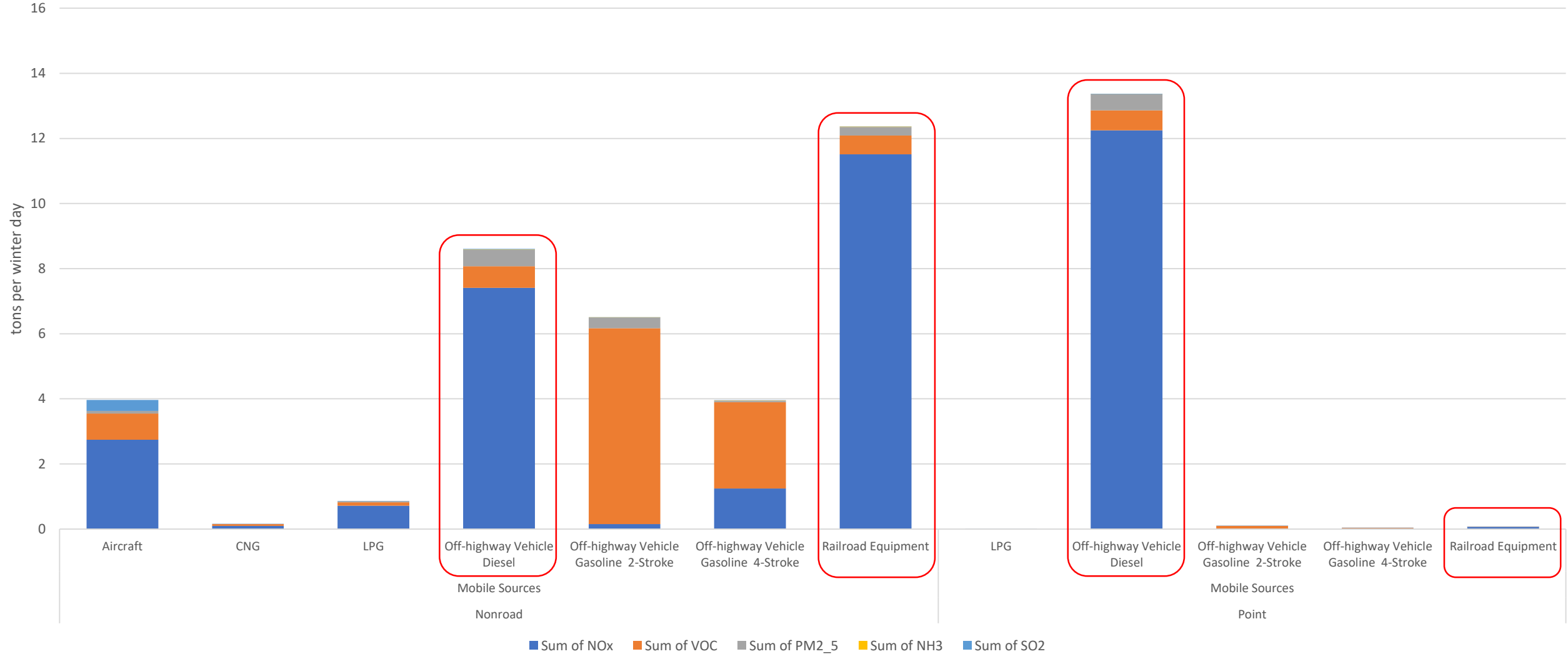
Wasatch Front 2017 Winter Emissions by Source



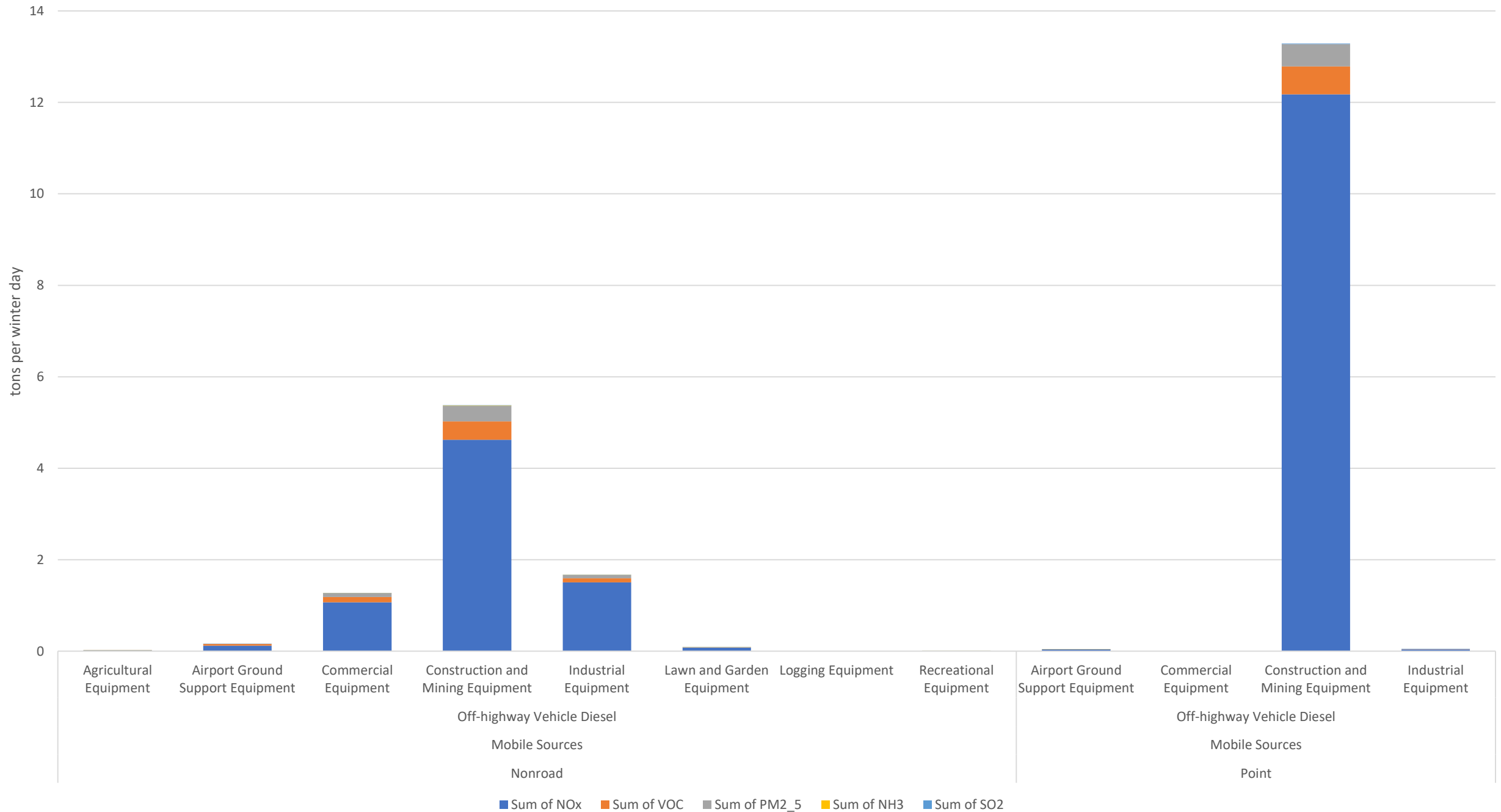
Wasatch Front 2017 Winter Emissions by Source



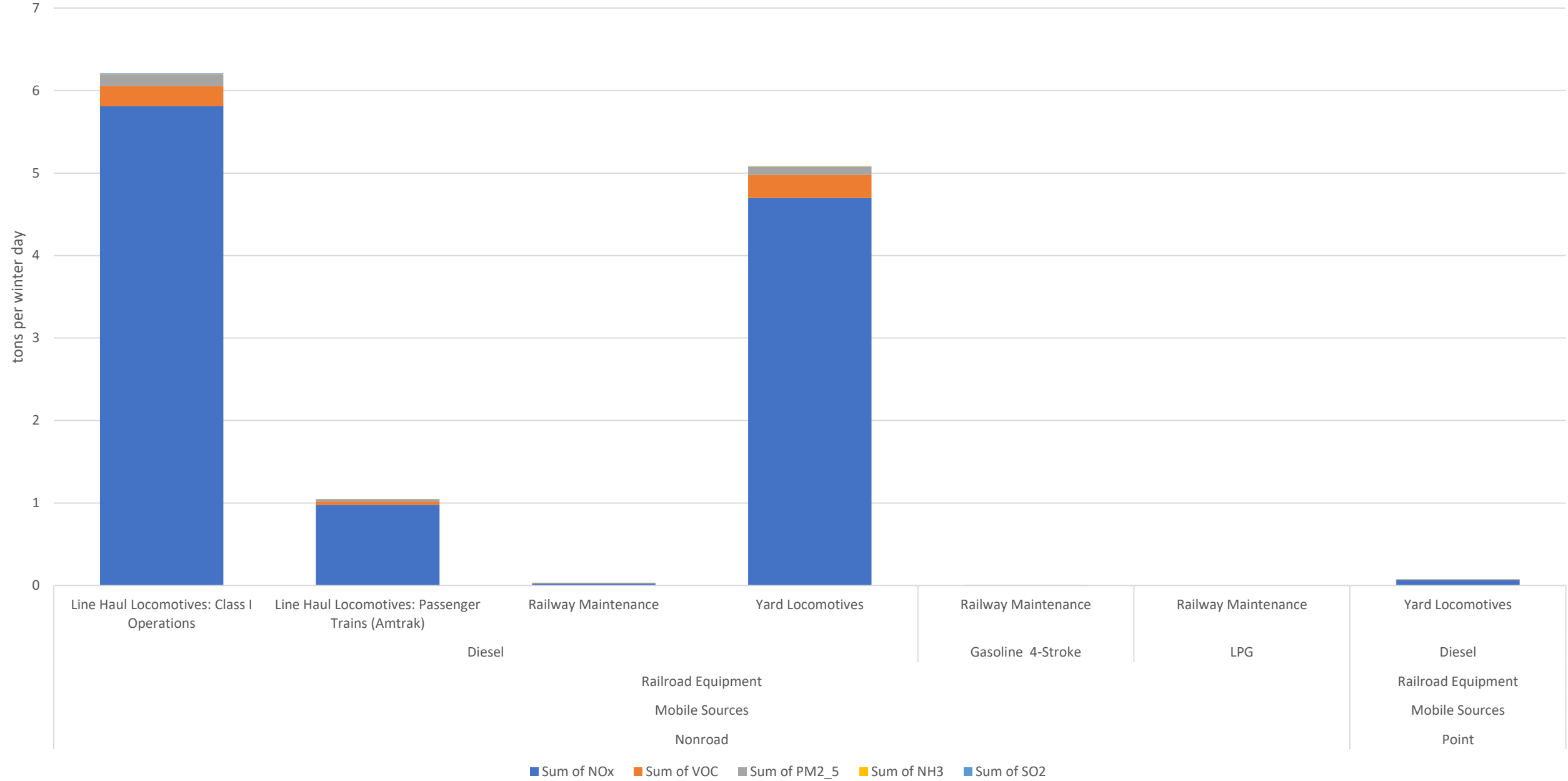
Wasatch Front 2017 Winter Nonroad Emissions by Source



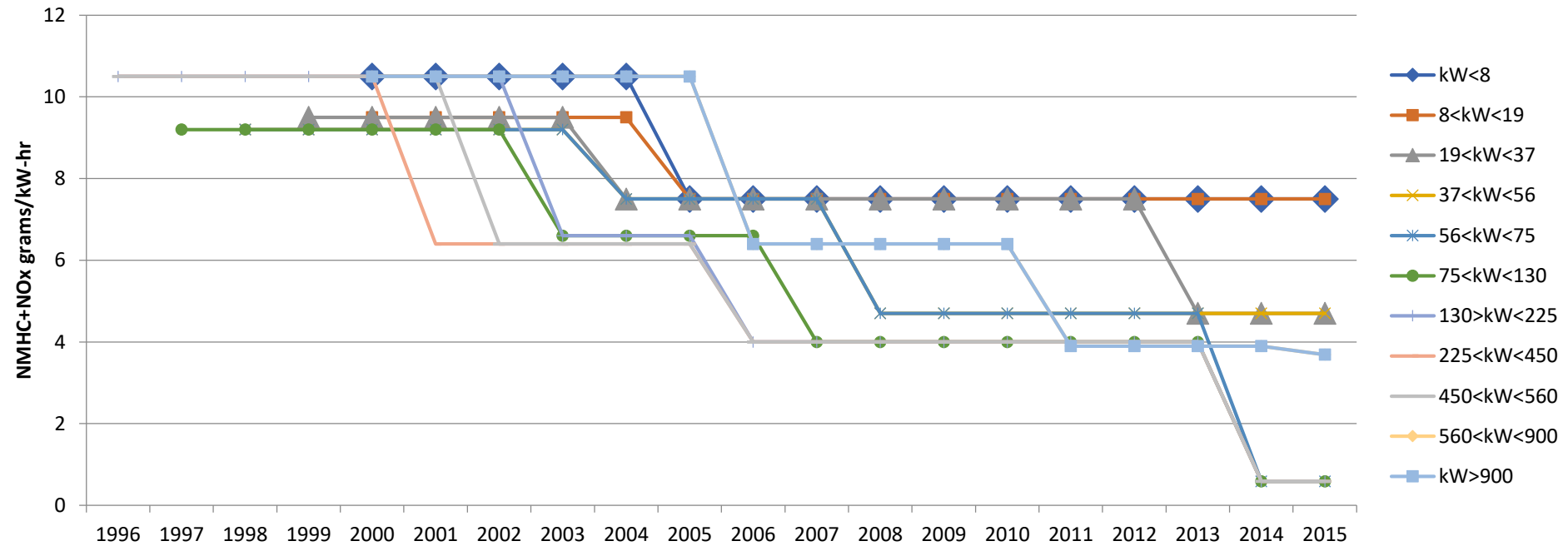
# Wasatch Front 2017 Winter Off-highway Diesel Emissions by Source



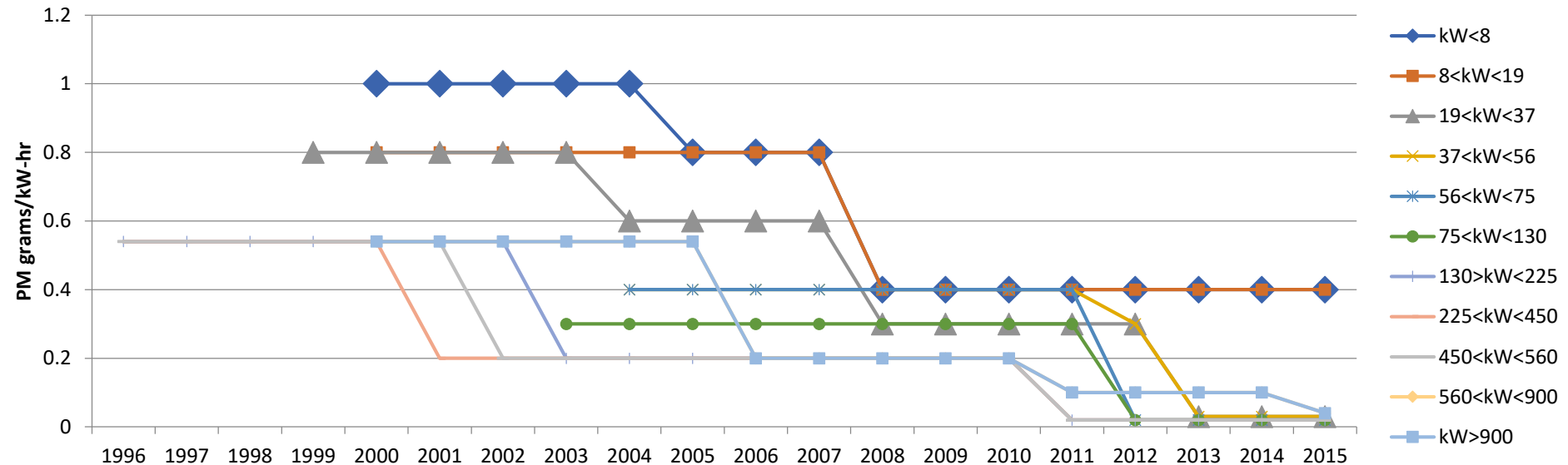
Wasatch Front 2017 Winter Railroad Equipment Emissions by Source



## Nonroad Diesel Engine Standards (NOx)



## Nonroad Diesel Engine Standards (PM)

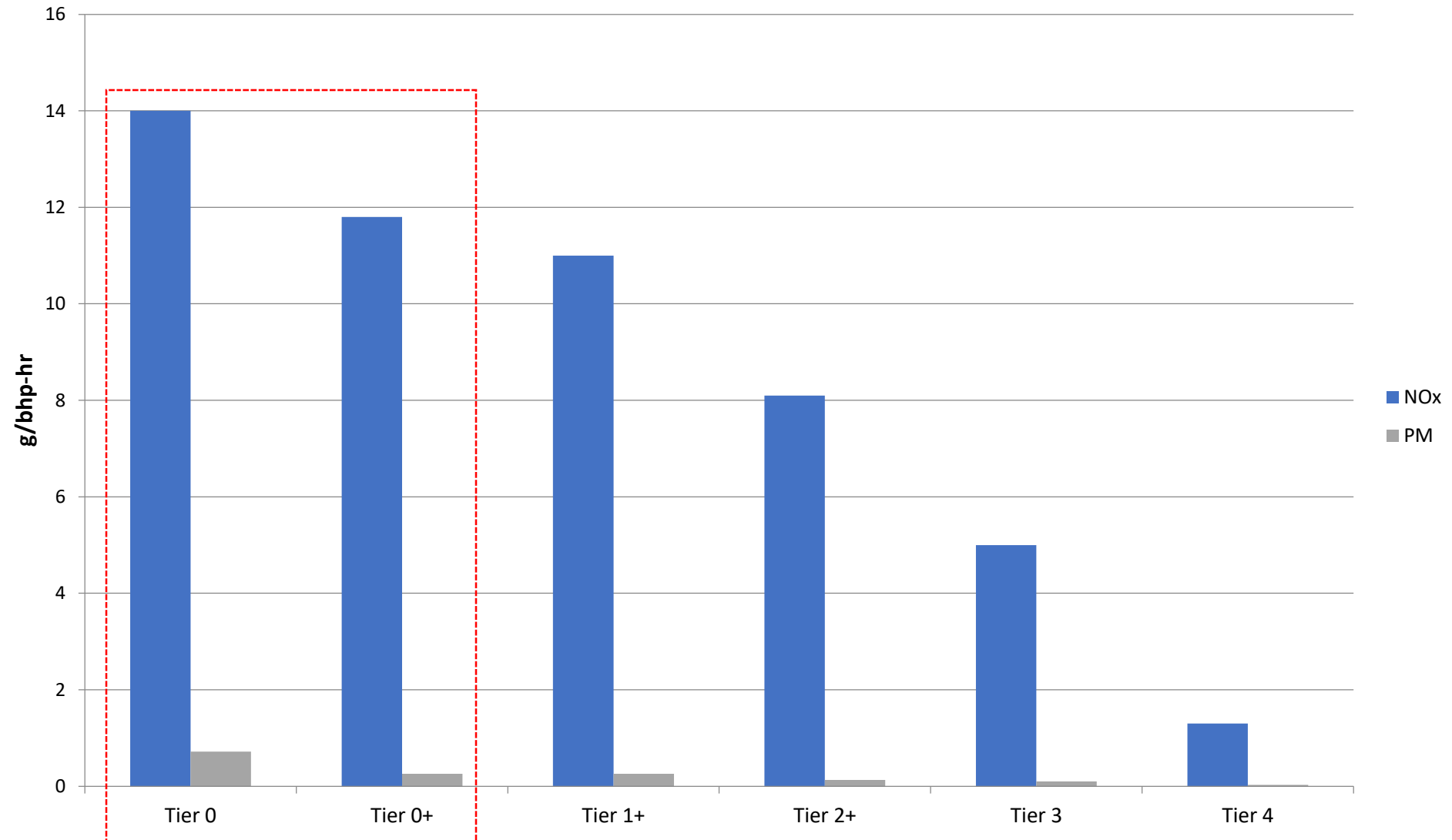


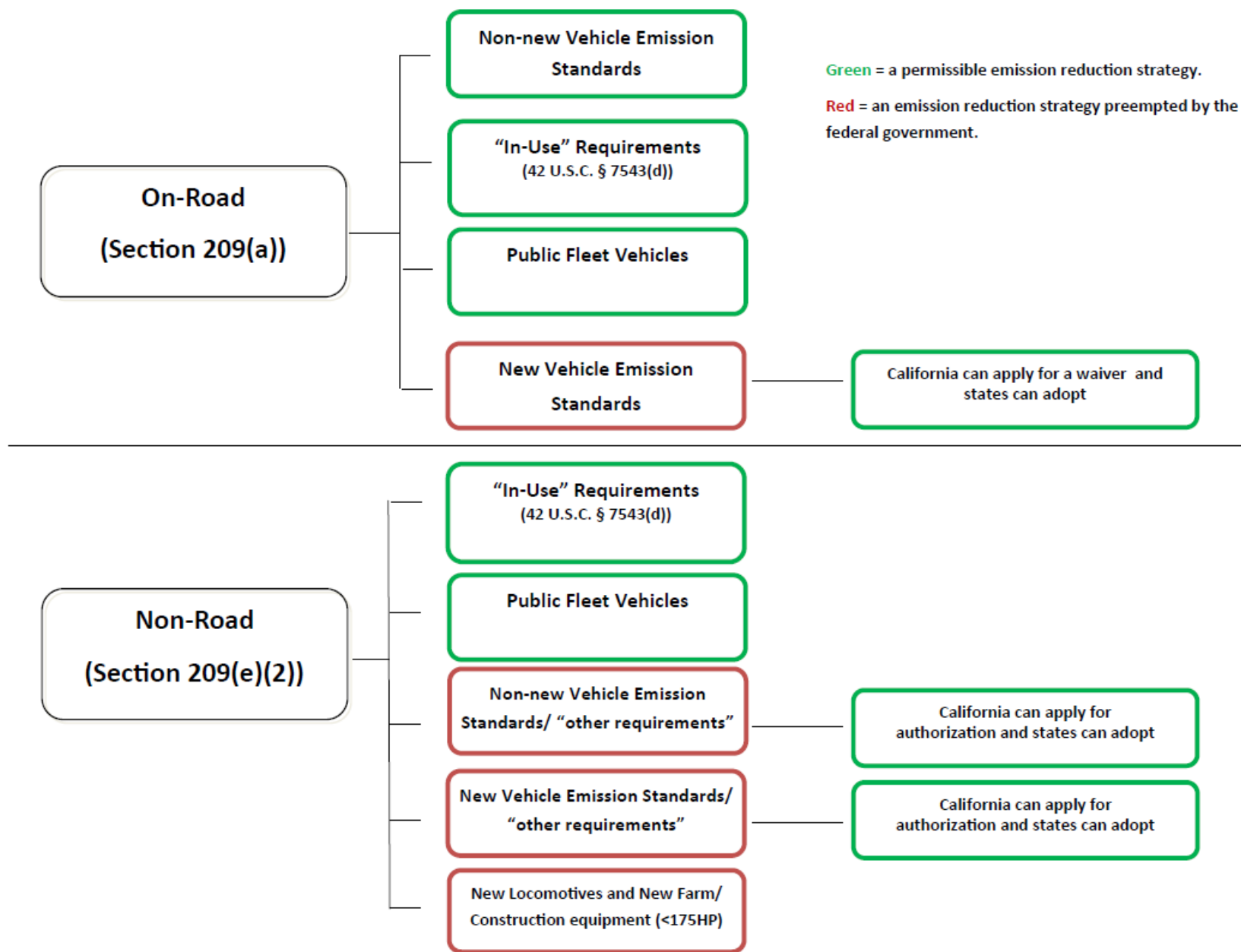
# EPA Locomotive Emissions Standards

- Two generations:
  - December 1997: Tier 0-2 standards
  - March 2008: Tier 3-4 standards; more stringent Tier 0+, 1+, and 2+ remanufacturing standards

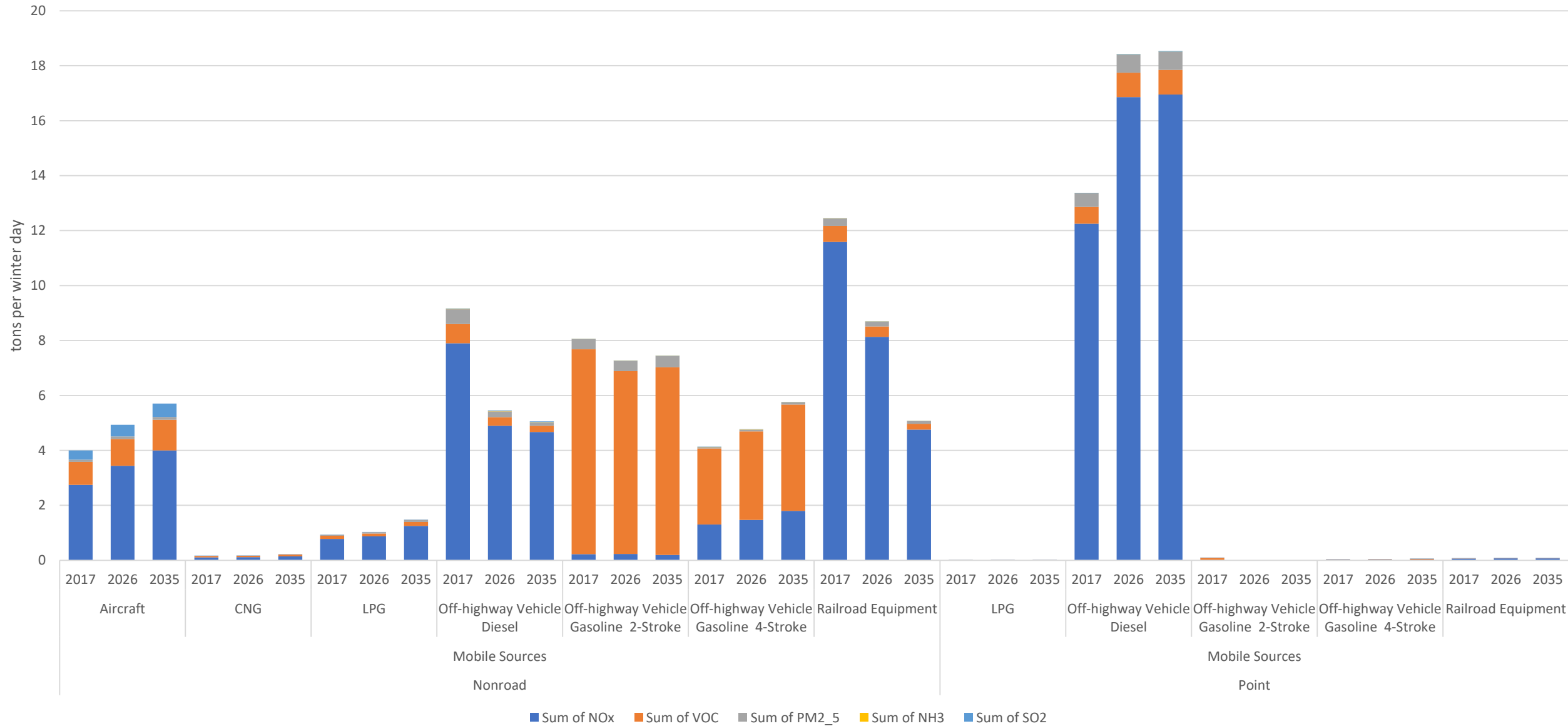


# EPA Switcher Locomotive Standards





## Wasatch Front 2017 Winter Emissions by Source 2017-2035



# Questions?



# March 2008 (2<sup>nd</sup> Generation)

## Switcher Locomotive Emissions Standards (g/bhp-hr)

Tier	MY	Date	HC	CO	NOx	PM
Tier 0+	1973-2001	2010 <sup>b</sup>	2.10	8.0	11.8	0.26
Tier 1+ <sup>a</sup>	2002-2004	2010 <sup>b</sup>	1.20	2.5	11.0	0.26
Tier 2+ <sup>a</sup>	2005-2010	2010 <sup>b</sup>	0.60	2.4	8.1	0.13 <sup>c</sup>
Tier 3	2011-2014	2011	0.60	2.4	5.0	0.10
Tier 4	2015 or later	2015	0.14 <sup>d</sup>	2.4	1.3 <sup>d</sup>	0.03

a - Tier 1-2 switch locomotives must also meet line-haul standards of the same tier.

b - As early as 2008 if approved engine upgrade kits become available.

c - 0.24 g/bhp-hr until January 1, 2013 (with some exceptions).

d - Manufacturers may elect to meet a combined NOx+HC standard of 1.3 g/bhp-hr.

Source: <https://www.dieselnet.com/standards/us/loco.php>



